Asynchronous Requests

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Asynchronous Data Requests

• When you load a website, the initial HTML document often references many other resources (images, JavaScript files, CSS stylesheets, and so forth) to be downloaded as well.
• Some resources—images and videos, in particular—can be very large. The larger the resources, the longer it takes for the application to load and properly function.
• Most web applications minimize the amount of data needed for the initial user interaction. By doing so, their website loads more quickly, and the application is operational with minimal lag time.
• As new resources are needed, the website can download those resources in the background—that is, *asynchronously*. Once the new resources have been downloaded, JavaScript can programmatically update the DOM to incorporate them.

Asynchronous Data Requests

• The initial resource needed by most web applications is almost always formatted as HTML, which includes data and information about how it should be presented in the browser.
• Asynchronous requests, however, generally fetch data as plaintext or JSON format without the surrounding HTML. The new data can be programmatically inserted into the DOM.
• As with the initial request for the HTML document, asynchronous data requests are framed as URLs, as with:
  - `graph.facebook.com/me` (Facebook API)
  - `api.twitter.com/1.1/statuses/user_timeline.json` (Twitter API)
  - `numbersapi.com/122` (Toy API providing fun facts about numbers)
  - `numbersapi.com/122?json=true` (Same API that formats response as JSON)
• Most servers can infer from the URL itself whether the response should be HTML, plaintext, or JSON.

Asynchronous Data Requests

• Life would be terrific if we had JavaScript functionality to do the same thing a browser can—to programmatically request a resource through some URL, wait for a server response, and then process that response to suit the needs to the application.

Fortunately, life is terrific!

Asynchronous Data Requests

• JavaScript provides built-in libraries to help asynchronously fetch resources as they’re needed. Unfortunately, they rely on JavaScript features slightly beyond the scope of our syllabus.
• The CS106AX libraries include two classes that layer over the complexities of those built-ins so we can still asynchronously fetch new resources.
• Those new classes are called `AsyncRequest` and `AsyncResponse`.

```javascript
let req = new AsyncRequest("http://numbersapi.com/538");
req.addParams({json: true});
req.onSuccess((response) => {
  console.log(response.getPayload());
}).onError((error) => {
  console.log(error);
});//
req.send();
```

• The code above illustrates how these classes can be used to publish some trivia about the number 538 to the console.
AsyncRequest and AsyncResponse

AsyncRequest \(\text{url}\)

- Creates a request object primed to fetch a document from \(\text{url}\).

request.addParam(key, value)

- Adds a key-value pair to the request's query string.

request.addParam(params)

- Adds all key-value pairs in \(params\) to the request's query string.

request.setSuccessHandler(callback)

- Sets the callback to be executed when the server responds.

request.setErrorHandler(callback)

- Sets the callback to be executed if the server fails to fetch the \(\text{url}\).

request.send()

- Initiates the request for the relevant resource.

response.getPayload()

- Returns the payload from the response passed to your callback.

AsyncResponse and JSON.parse

- The callbacks passed to request.setSuccessHandler and request.setErrorHandler should be functions that take a single argument of type AsyncResponse.
- AsyncResponse exports several methods, but in a success scenario, the only one that matters is getPayload().
- If the payload is formatted as a JSON string, then you should pass that string to the built-in JSON.parse function to rehydrate it into a true JavaScript object.

Exercise: Number Trivia Slideshow

Implement a program that generates a random number between 1 and 200 and presents a random piece of trivia about the new number. Allow the user to increment and decrement that number by clicking + and - buttons, and with each increment and decrement present some new morsel of information about the new number. Asynchronously fetch the trivia only as the number is being showcased.